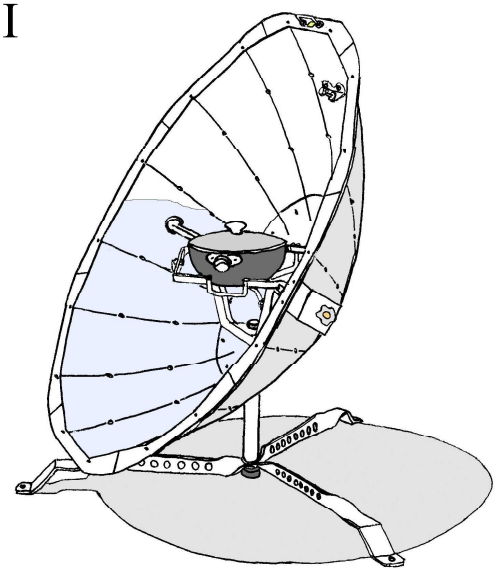
The Karupika Solar Cooker

from the Kirapika Solar Cooker Series

Do-It-Yourself Manual V3-I

Model: IP8E / F



Amane Studio

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Thank you very much for purchasing the Karupika solar cooker.

* Please read carefully this do-it-yourself manual, and assemble the kit properly.
* Please have this manual in your careful keeping and provide for a rainy day.
* Please refer to the ***User Manual*** for handling the solar cooker.

We humbly ask you to understand that the do-it-yourself kit is not covered by our one-year warrant.

1. Checking the Parts

Please check all the parts and their required quantities you have in the package.

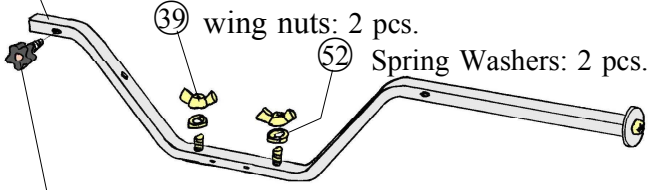
① Core Bar: 1 pc.

Knob Bolt C: 1 pc. ㉖

㉖ Core Bar Extension ②: 1 pc.

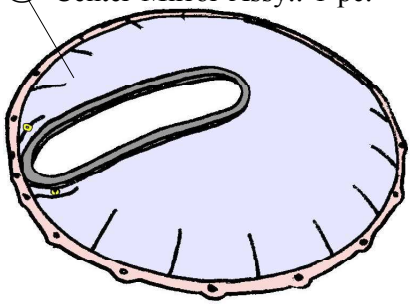
㊴ wing nuts: 2 pcs.

㊷ Spring Washers: 2 pcs.



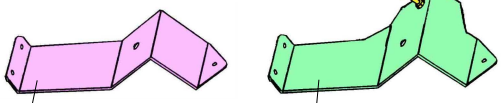
㊸ Bar End Washer: 1 pc.

③ Center Mirror Assy.: 1 pc.



㉖ Knob Bolt C: 1 pc.

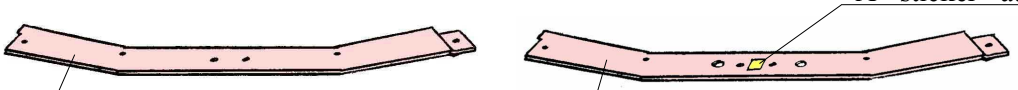
㊶ Long Bolt M4*30 mm: 1 pc.



④a Holder A: 1 pc.

④b Holder B: 1 pc.

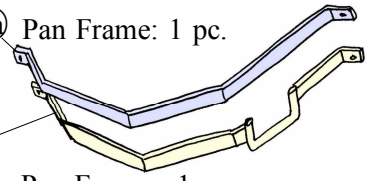
A sticker attached



⑤a KARU Flanges: 7 pcs.

⑤b Top KARU Flange: 1 pc.

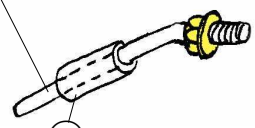
⑨a Pan Frame: 1 pc.



⑨b Concave Pan Frame : 1 pc.

⑥ KARU mirrors (A) : 12 pcs.

⑪ Trivet Rod E: 1 pc.

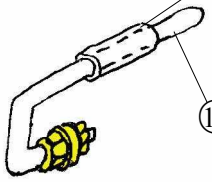


⑦a KARU mirror (Ba) : 1 pc.

⑩ Bushes: 2 pcs.

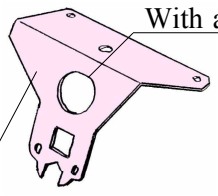
㉜ Rubber Tubes: 3 pcs.

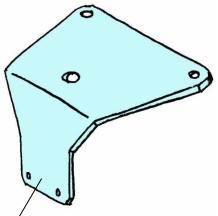
⑦b KARU mirror (Bb) : 1 pc.



⑫ Trivet Rods F: 2 pcs.

With a large hole





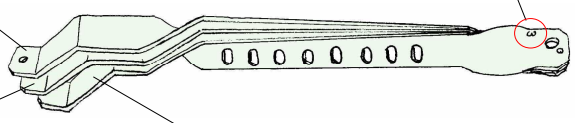
⑧ KARU mirror (C) : 1 pc.

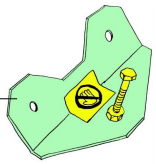
⑬a Summer Angle Setter: 1 pc.

⑬b Winter Angle Setter: 1 pc.

⑱ Leg No. 1: 1 pc.

Numbers punched.





⑲ Leg No. 2: 1 pc.

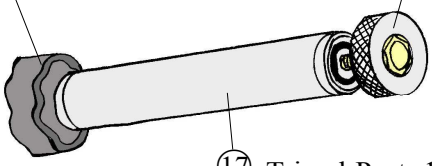
⑳ Leg No. 3: 1 pc.

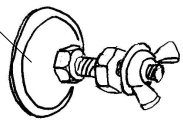
㉕ Sighting Device Assy.: 1 set

㉚ Knob Bolt D: 1 pc.

㉙ Finger Nut K: 1 pc.

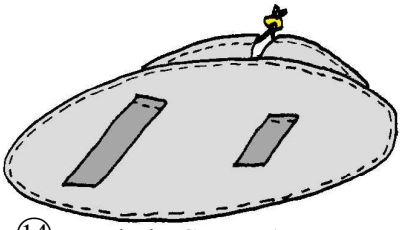
㉔ Adjusting Bolt A: 1 set



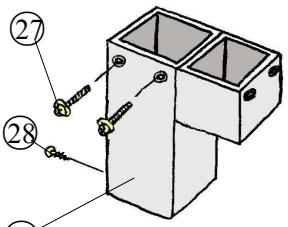


⑰ Tripod Post: 1 pc.

Hexagon-head Bolts M4*18 mm with cross recess (silvery): 2 pcs. ㉗



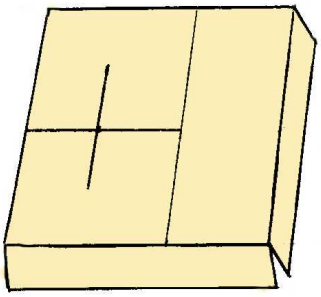
Tapping Screws 4*8: 2 pcs. ㉘



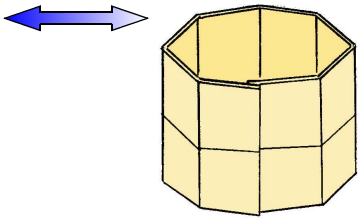
⑯ Spacer Sleeve: 1 pc.

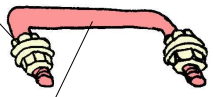
⑭ Parabola Cover: 1 pc.

㊱ Flange Nuts (large): 4 pcs.



Both made of cardboard





⑮ Handgrip: 1 pc.

㊶ Grease: 1 pack

㉑ Center Mirror Box: 1 pc.

㉒ Column-base for assembling work: 1 pc.

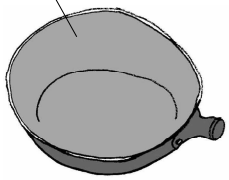
㊷ Body of the Pan: 1 pc. (20 cm for the **E** model, and 18 cm for the **F** model)

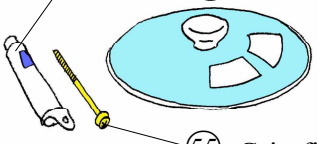
㊹ Grip of the Pan: 1 pc.

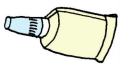
㊵ O-ring Pack

㊸ Glass Cover: 1 pc.

㊳ Instant adhesive





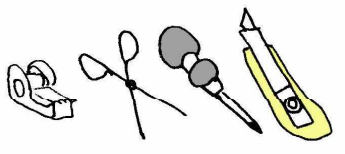


㊺ Grip-fixing Bolt: 1 pc.

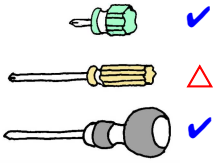
【 Documents 】

- User Manual……..…… 1 copy
  (with the Diagrams for the Timing of the Solar Cooker Rearrangements)
- Do-it-yourself Manual ……1 copy

* Screws and nuts are supplied in somewhat extra quantities.
  Keeping them in monkey dishes helps your works go well.
* Your needful tools;
  A Scotch tape,scissors, Phillips screwdriver, and cutter-knife.



NOTE! The driver bit should be a Phillips #2, and a heavy-duty grip required.



* An electric driver helps your works go quite quick.

NOTE! Avoid a windy place for your works.

-- - Clip and paste the following labels on screw and nut bags, and have smooth jobs - --

㉝ 50 pcs. Flange Nuts (small, sunny yellow)	㊷ 24 pcs. Machine Screws M3 * 6 mm (sunny yellow)
㉞ 4 pcs. Machine Screws M4 * 8 mm(silver)	㊹ 2 pcs. Hexagon-head Bolts M6 * 25 mm (silver)
㉟ Tooth-picks 5 pcs.	㊺ 12 pcs. Machine Screws M4 * 12 mm (sunny yellow)
㊱ 2 pcs. Flange Nuts (large, sunny yellow)	㊻ 17 pcs. Flange Nuts (medium, sunny yellow)
㊲ 16 pcs. Machine Screws M3 * 8 mm (sunny yellow)	㊼ 10 pcs. Machine Screws M3 * 6 mm (stainless steel)

2. Assembling the Outer Frame

1. Mount the Handgrip (15) on KARU Flange Top (5b).

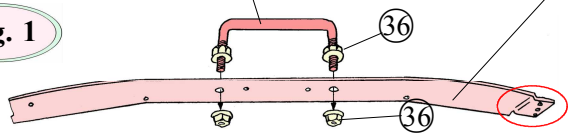


Fig. 1

Close-up

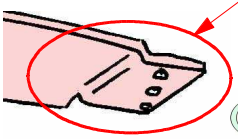


Fig. 2

The Summer Angle Setter (13a) can be used as a wrench.

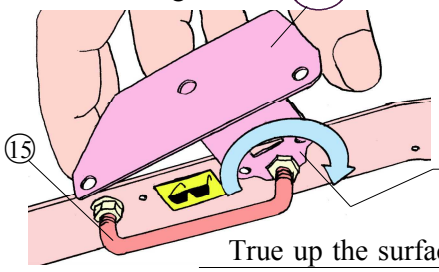


Fig. 3

NOTE!

An excessive torque deforms the setter metal.

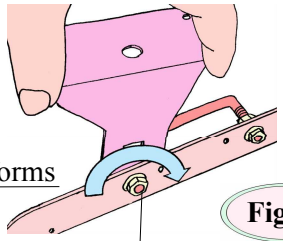


Fig. 4

True up the surfaces of handgrip-ends and nuts flat.

2. Put together, by hand-start, KARU Flanges (5a) and (5b) to make a circular form. (See **Figs. 5** and **6**). Fit the bosses into holes at their overlapping areas, and hand-tack them with the Screws (45) and Nuts (46).

3. Tighten fully all the Screws (45) on the circular Flange.

NOTE! Loose tightening causes the outer frame deformed into an ellipsoidal shape under the influence of the external pressure. All the Screws (45) must be tighten firmly.

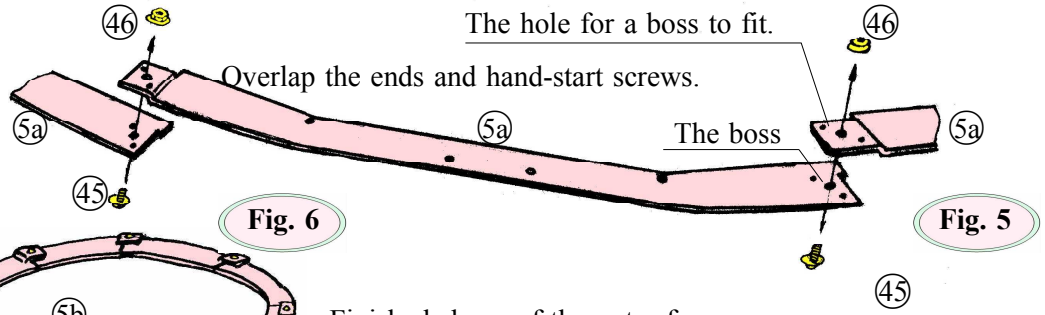
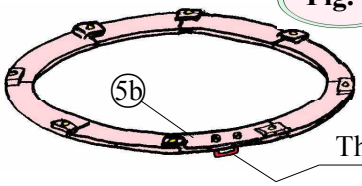


Fig. 6

Fig. 5



Finished shape of the outer frame.

The Handgrip (15) comes to the top of the completed solar cooker.

3. Assembling the Core Bar Assy.

1. Mount the Trivet Rods F (12) on the Pan Frames (9a) and (9b), and tighten them with two flat surfaces of the Nuts (36).

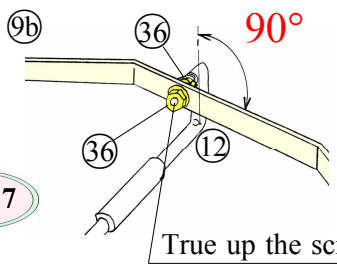


Fig. 7

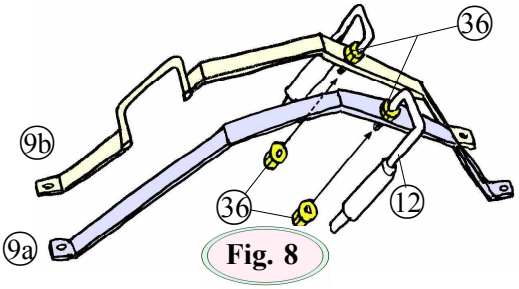


Fig. 8

True up the screwed Trivet Rod end and the nut surface flat.

2. Screw the Trivet Rod E ⑪, with the Nut ㊱ on its screwed part, into a screwed hole on the Core Bar ①.

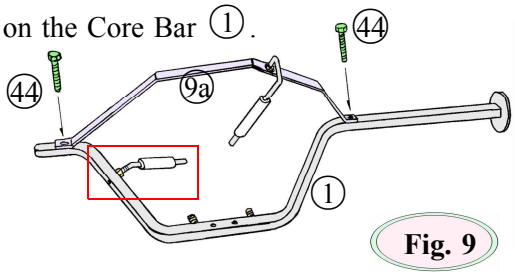


Fig. 9

Prior to **Step 3.2** the Nut ㊱ is mounted on the screwed part of the Trivet Rod E ⑪.

Close up

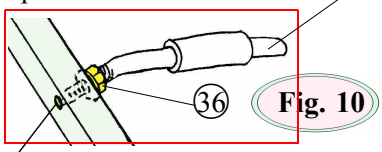


Fig. 10

True up the male screw end and the bar surface flat.

3. Mount the Pan Frame ⑨a on the Core Bar ① with two Bolts ㊹.

4. Mount the Pan Frame ⑨b on the Core Bar ① and tighten bolts with two Nuts ㊱.

On this area, do not give an excessive torque.

Hold this part to tighten the screw.

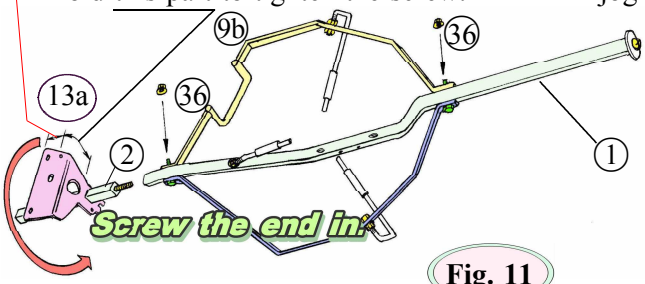


Fig. 11

A jog between surfaces does not matter.

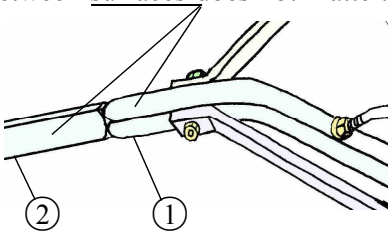


Fig. 12

5. Screw fully the end of the Core Bar Extension ② into a hole at the Core Bar ① end.

NOTE! As loosening of the link between two bars during usage makes the parabola unstable, tighten the extension firmly.

At this assembly stage, please choose one of the three different positions depending on the solar altitude.

Position A

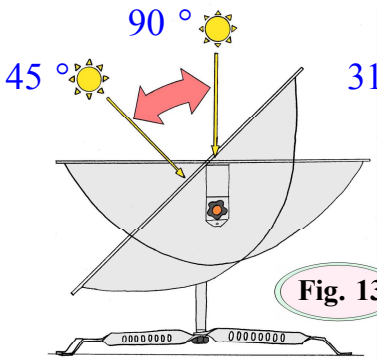


Fig. 13

Position B

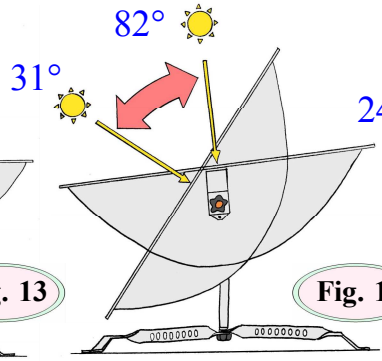


Fig. 14

Position C

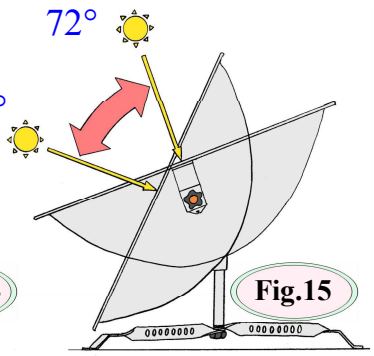


Fig.15

For high solar altitudes

For medium solar altitudes

For low solar altitudes

1. Check the latitude of the area where you plan to use the solar cooker.
2. Check the Diagrams for the Timing of the Solar Cooker Rearrangements at the end of the

User Manual. Select the set of circle charts applicable to the latitude of your area, and then select "**a.**" or "**b.**" shown below.

a. I will rearrange the solar cooker to the appropriate position for each season, because I want to be able to use the solar cooker all the time, all year round.

b. I will choose the position that enables me to use the solar cooker for the longest period of time in the year without rearranging it because it's a lot of work. (In this case, please note that there will be some minutes of the day when you cannot align the solar cooker with the sun at certain periods of the year.)

If you chose "**a.**" above, use the position applicable to each season shown in the large circle chart.

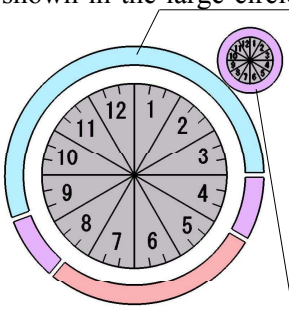


Fig. 16

Fig. 16 shows example of areas with latitudes between **25°**and **27.5°** N (in decimal degrees).

■ The period of use: May 1 to Aug. 10 à → Position A

■ Aug. 11 to Sep. 10 and Apr. 1 to Apr. 30 à → Position B

■ Sep. 11 to Mar. 31 à → Position C

If you chose "**b.**" above, use the position shown in the small circle chart at the top right of the large circle chart.

In this example, ■ the suitable position is Position B.

Position A

Loosely tighten the Spacer Sleeve ⑯ on the Core Bar ①.

* The concave part comes at the back.

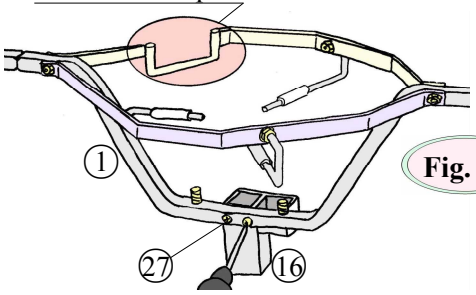


Fig. 17

How it is mounted when looking from above.

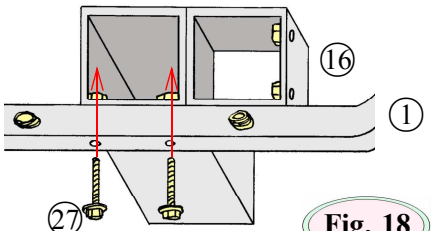


Fig. 18

Loosely tighten the Summer Angle Setter 13a on the Spacer Sleeve ⑯.

Firmly tighten all the bolts and screws.

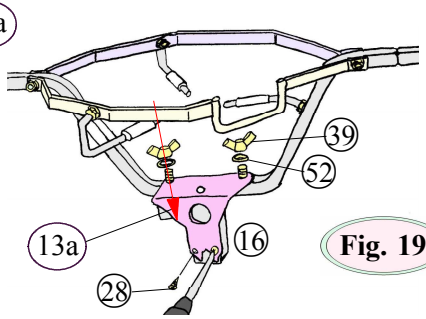


Fig. 19

Position B

Loosely tighten the Spacer Sleeve ⑯ on the Core Bar ①.

* The concave part should be at the front.

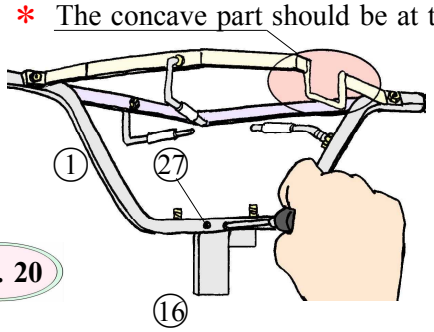


Fig. 20

How it is mounted when looking from above.

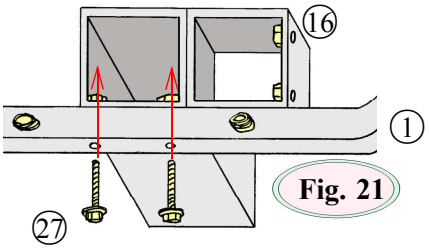


Fig. 21

Loosely tighten the Summer Angle Setter 13a on the Spacer Sleeve ⑯.

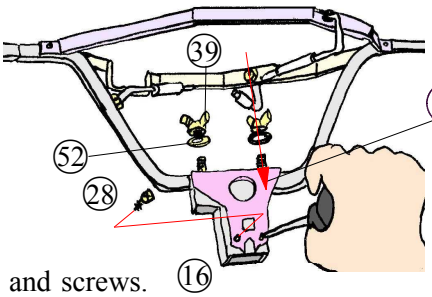


Fig. 22

Firmly tighten all the bolts and screws.

Position C

Loosely tighten the Spacer Sleeve ⑯ on the Core Bar ①.

* The concave part should be at the front.

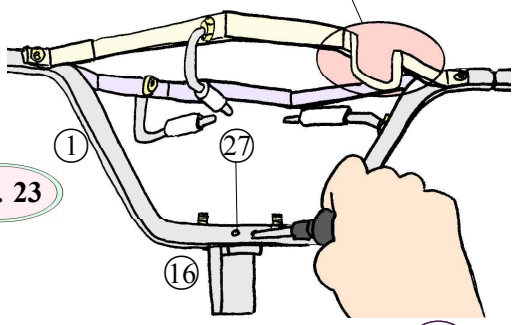


Fig. 23

The make-up looked down.

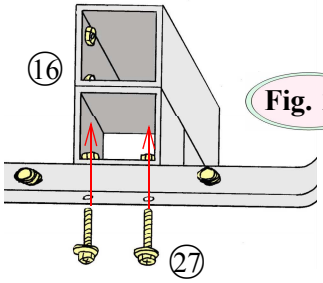


Fig. 24

Loosely tighten the Winter Angle Setter 13b on the Spacer Sleeve ⑯.

Firmly tighten all the bolts and screws.

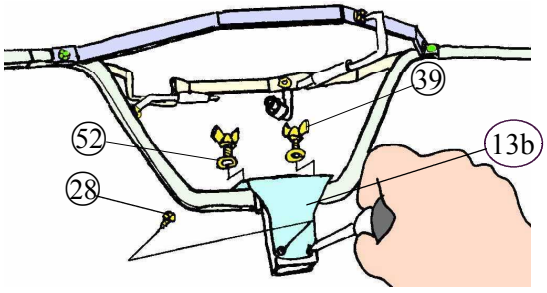


Fig. 25

NOTE! Bolt ㉗ and screw ㊴ tend to loosen during usage. Screw them in tightly.

4. Assembling the Mirror

1. Bent two ears on each of the KARU Mirrors ⑥, ⑦ and ⑧ on the right lines marked with notches at a 45-degree angle. → See **Fig. 27**

It is highly recommended to bend them against a hard edge of a table or anything else to achieve sharp lines. A round edge is NOT desired. Get straight sharp bent-lines.

NOTE! Incorrect bent-lines result in undesired finish.

NOTE! Be aware of a slight difference between locations of notches on both sides.

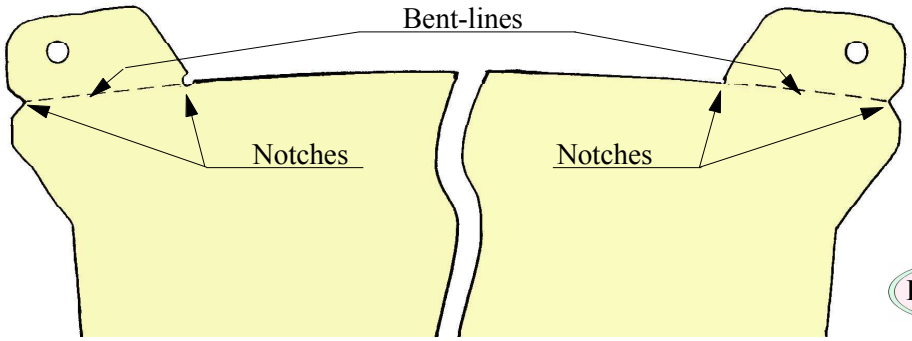


Fig. 26

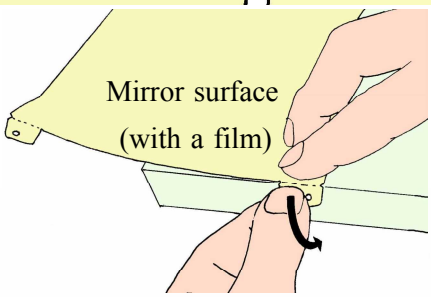


Fig. 27

Bent it at a sharp straight line.

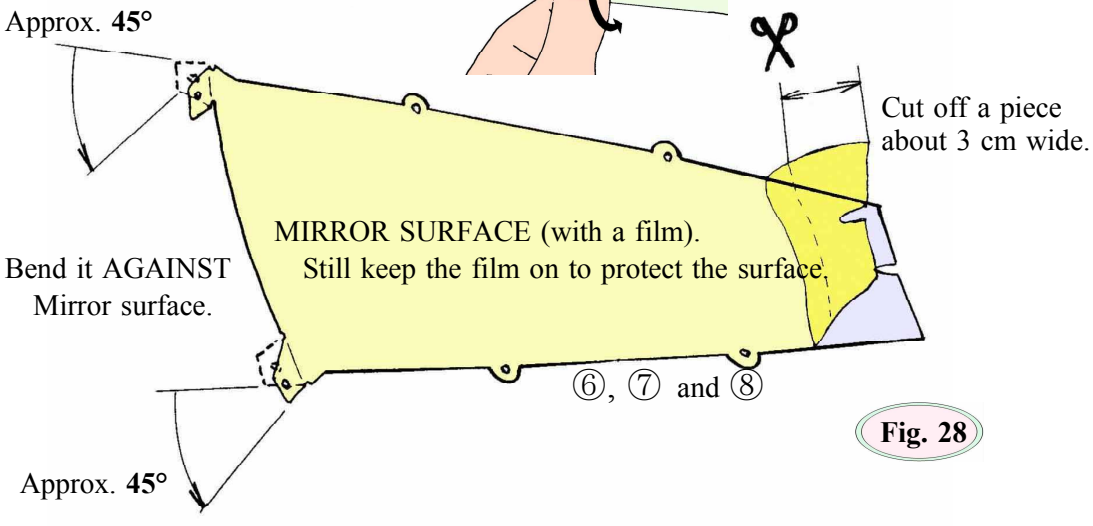


Fig. 28

2. Before starting next step, please look at the rear face of the Center Mirror Assy. ③.

IMPORTANT NOTE! Please do not pull out black screws on four hookups of the metal band as shown with * marks on **Fig. 29**, or the Center Mirror Assy. loses its shape, and it is difficult to regain it.

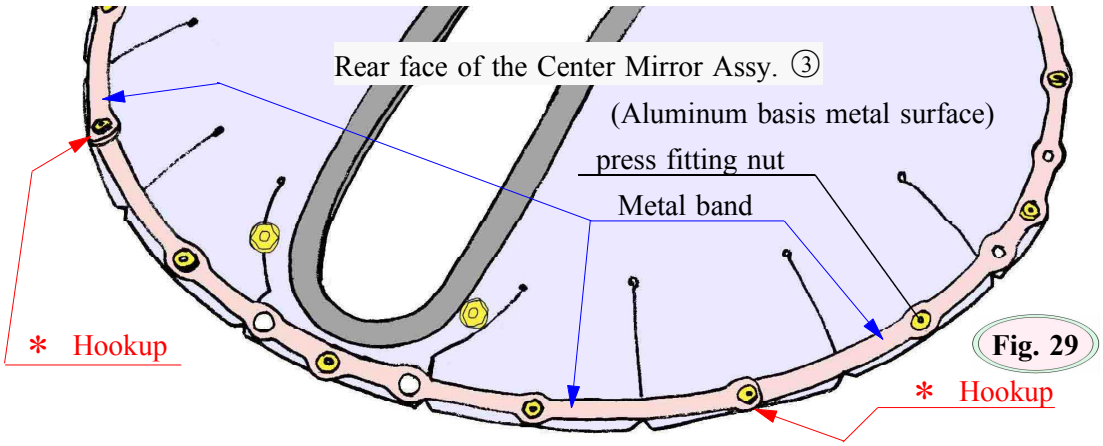


Fig. 29

3. Lay down the Center Mirror Assy. ③ on soft cloth (the Parabola Cover may be used), and loosen the screw as shown on **Fig. 30**.

   If the Center Mirror Assy. is set on a cloth-covered bucket, rather than a cloth-covered flat surface, you can make the assy. more stable during your works.

NOTE! Be careful not to spoil screw heads with the driver tip, or the scratches on the heads cause poor results of mopping the mirror surface, with fine and nasty fibers pulled out of a rag and left on screw heads.

NOTE! Excessive pressure on the nut on metal band makes it drop off to the under side. Be careful not to press the screw head too strongly with the driver tip.

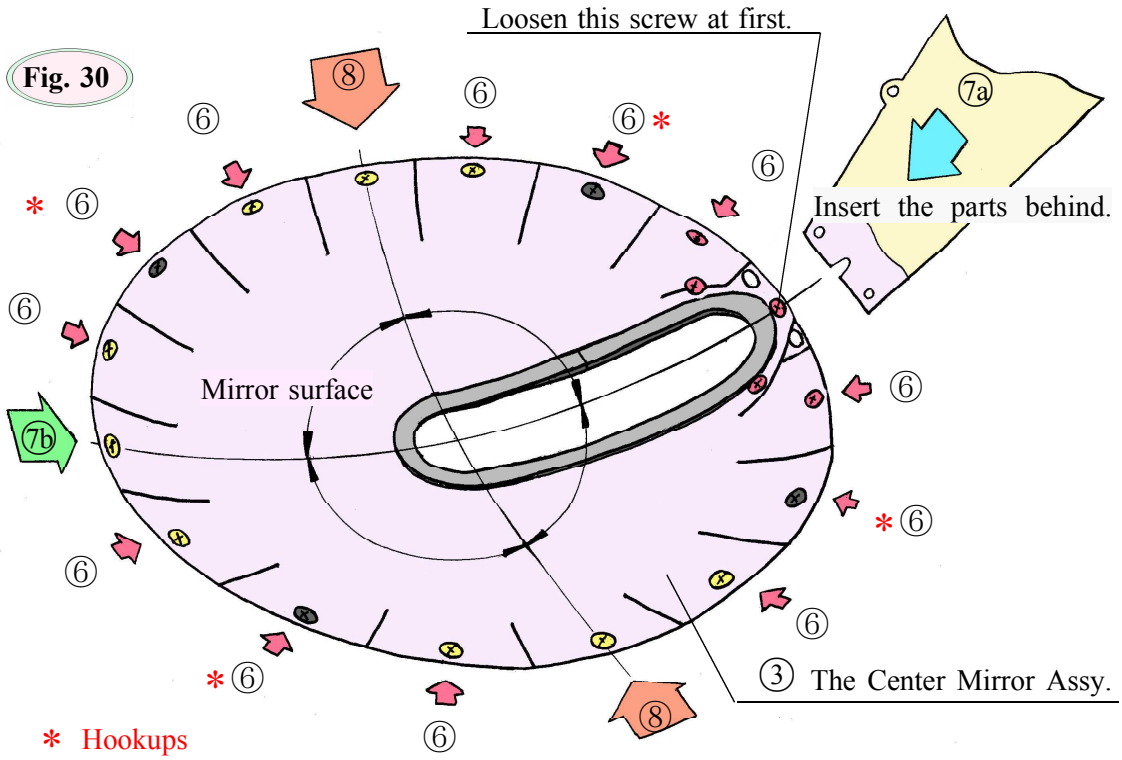


Fig. 30

4. Insert Mirror parts ⑦a between metal bands and the rear surface of the Center Mirror Assy. ③.

Using a Toothpick ㉟ makes it easy to ply the band from the Center Mirror to make a space where a Mirror ⑦ⓐ is inserted.

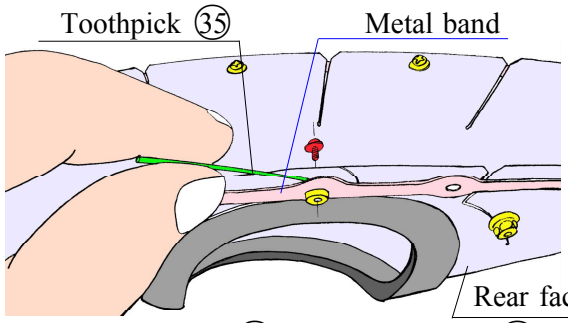


Fig. 31

5. Fix the Mirror ⑦ⓐ with the screw once loosen as shown in **Step 4.3** and two sets of Machine Screws ㊼ and Flange Nuts ㉝.

6. Loose all the rest of screws on the rim, and making spaces with the Toothpick ㉟, insert and fix "loosely" all the rest of KARU Mirrors ⑥, ⑦ and ⑧. The arrangement is shown in **Fig. 30**.

7. Check all the Mirror parts are;
   "Radially and properly arranged around the middle of the Center Mirror ③ " and
   "All the way seated in".
   Then, fully tighten all the screws.

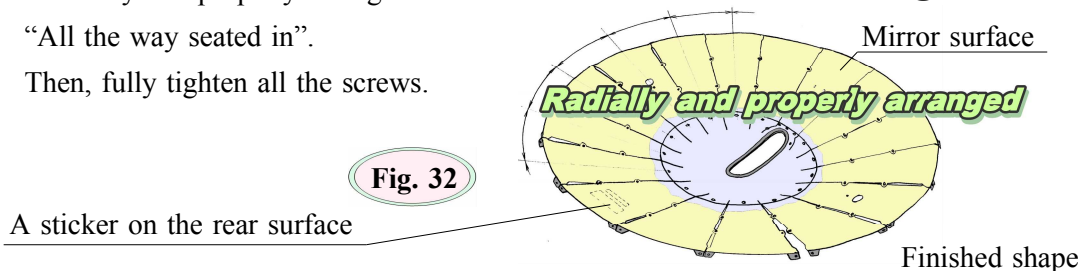


Fig. 32

NOTE! The Mirror is very FRAGILE at this stage. Be careful in handling.

8. Check again all the KARU Mirror parts ⑥, ⑦ and ⑧ are arranged in right locations.
   An error in assembling causes ill effects afterwards.
9. Remove all the protective films from KARU Mirror parts ⑥, ⑦ and ⑧.

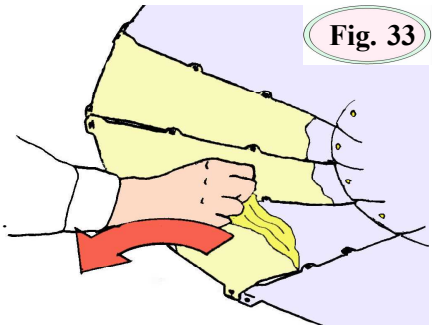
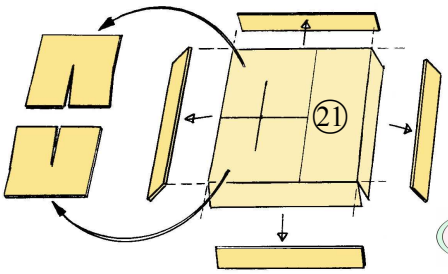


Fig. 33

5. Assembling the Parabola.

1. Cut off four side-boards of the Center Mirror Container ㉑, and cut the basal plate along the black lines.



Bent side-board-cuttings and make triangles.

Fig. 34

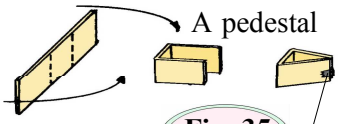
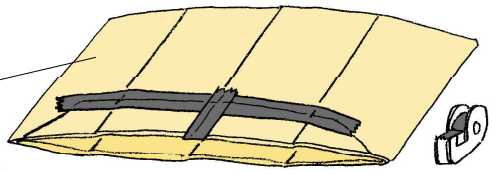


Fig. 35

Fix triangles with Scotch tape.

2. Bent side-board-cuttings at two lines as shown in **Fig. 35** to make four triangle-shaped "Pedestals".

Fig. 36



3. Put Scotch tape over cut lines of the Column-base for assembling work ㉒.

4. Place the inter-crossed plates, prepared in **Step 5.1**, into a column to make a regular octagon.

Fig. 37

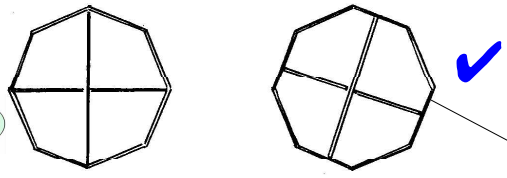
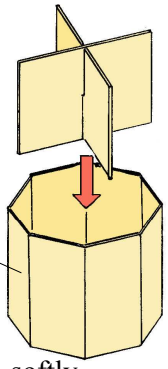


Fig. 38



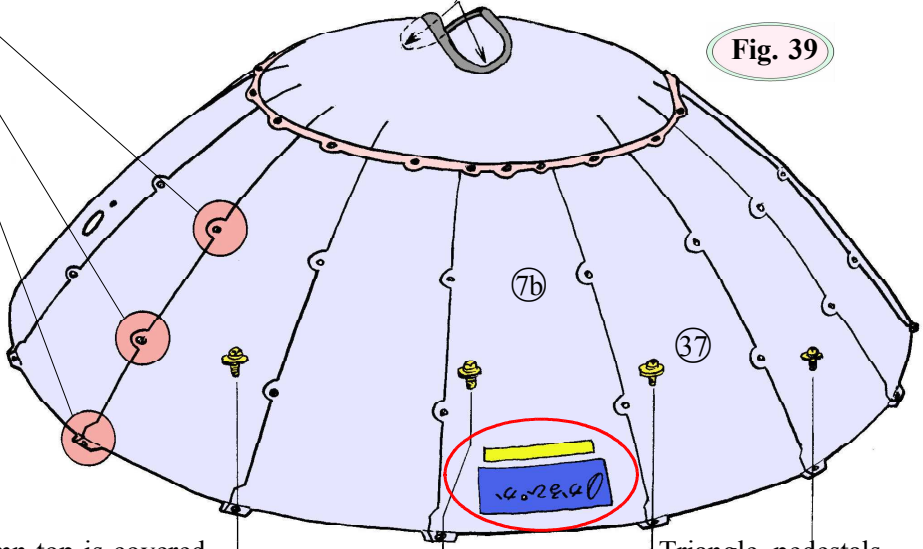
Column ㉒

5. Place a cloth (the Parabola Cover) over the column to protect the mirror surface.

The mirror on the right side overlaps the left one.

Hold the rubber-edged mouth softly.

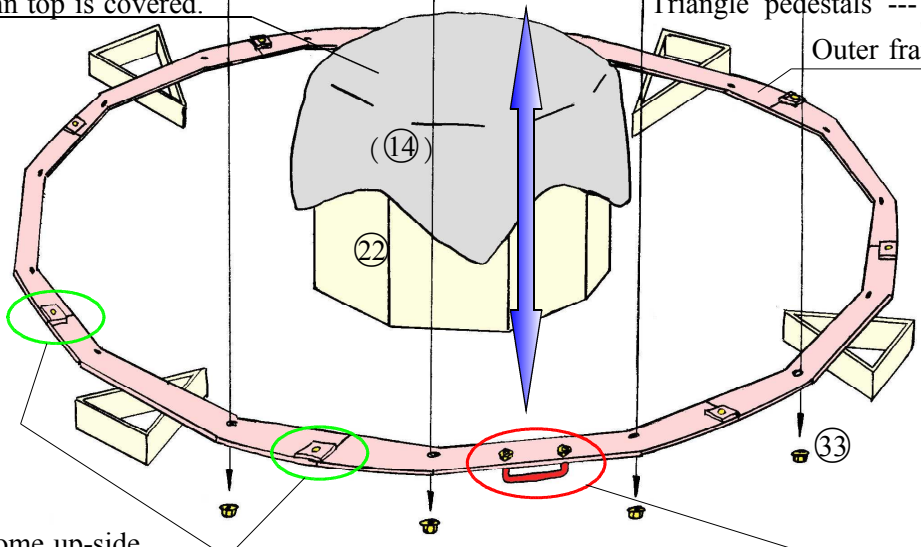
Fig. 39



The column top is covered.

Triangle pedestals --- 4 pcs.

Outer frame



Bosses come up-side.

Important NOTE! The label with a Karupika mark must come onto the Handgrip ⑮.

6. Put four triangle pedestals around the Column ㉒.

7. Put the Frame on four Pedestals.

NOTE! The workshop should be large enough for you to move around the Parabola, rather than moving it around.

If such a place is not available, and if you must move the Parabola around, you have better to attach four Pedestals to the bottom of the Outer Frame with Scotch tape beforehand.

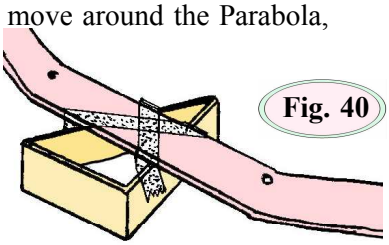


Fig. 40

8. Place the preliminarily assembled Mirror on the Frame.

9. Tighten loosely the Mirror to the Frame in 16 places with Screws ㊲ and Nuts ㉝.

The right one overlapping

In order to prevent the mirror assy. warping upward, fix it temporarily on the outer frame with two ㊲ tooth-picks inserted into the holes on both of holes next to the one to be screwed. At this time, check the overlapping parts of the mirrors as shown in **Fig.41**.

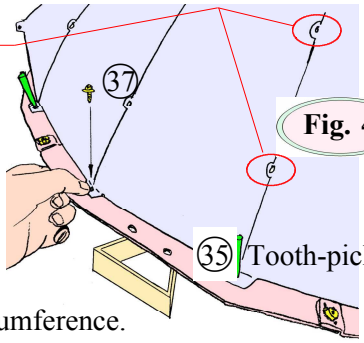


Fig. 41

10. Tighten LOOSELY all of 16 Screws ㊲ on entire circumference.

11. Cut off the column vertically, and divide it in half horizontally along the black line.Then, connect sections of two halves to make one large column.

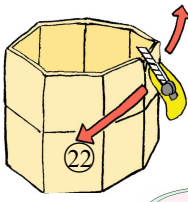


Fig. 42

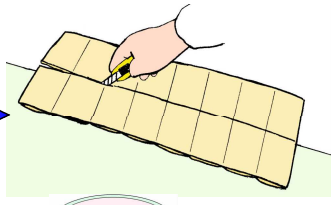


Fig. 43

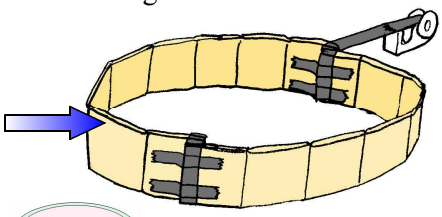


Fig. 44 Make a large column.

12. Place the cover over the large column, and put the Parabola on it with the mirror surface upward.

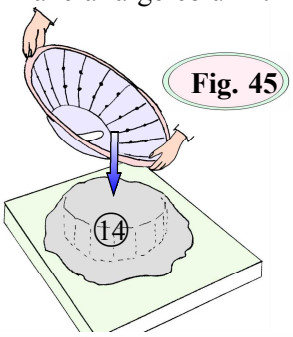


Fig. 45

13. Insert Screws ㊷ to screw-holes on inner two circles of the Mirror, and loosely fix them with nuts ㉝. → See **Fig. 48**.

Ten screws at the lower part MUST be the Stainless-steel Screws ㊼ instead of Screws ㊷ to avoid erosion caused by spills and splashes of boiling liquid. → See **Fig. 48**.

14. Check the entire mirror carefully to see if there is any bending or warping of the surface.

The nice secret for this step to be done well is to tighten screws in the numerical order of the circuits

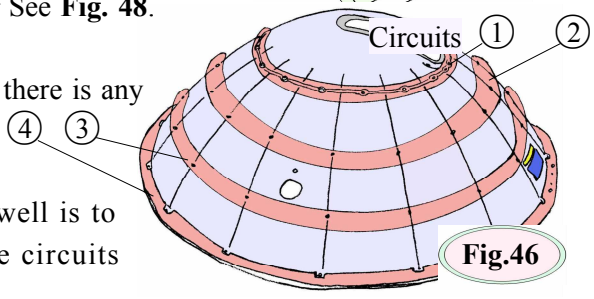


Fig.46

①, ②, ③ and ④, driving a warp of the mirrors to the outer areas. When still a warp remains, loose some of nearby screws for adjustments, and tighten them fully again.

NOTE! Any of Incorrect bent-lines, mentioned as a NOTE! in **Step 4.1** (Page 9), makes it impossible to avoid warping. In that case, you must adjust incorrect lines.

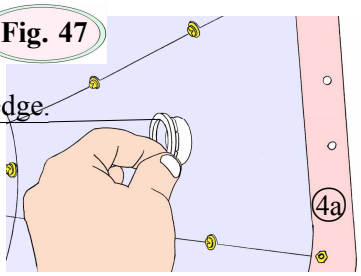
6. Mounting the Core Bar Assy.

All of four clicks of the Bush ⑩ must hold the hole-edge.

1. Place one of the Bushes ⑩ on the hole in the KARU Mirror ⑧ at the ④a side.

   → See **Figs. 47** and **48**.

Fig. 47



2. Insert the end of the Core Bar Assy. into the hole edged with the bush on the mirror surface.

   At first, insert the end with a washer deep into the hole on the parabola, and then move the assy. horizontally to insert the end of ② into another hole on the opposite side

Clicks of the Bush ⑩ face outside. (Both of the Position A and B.)

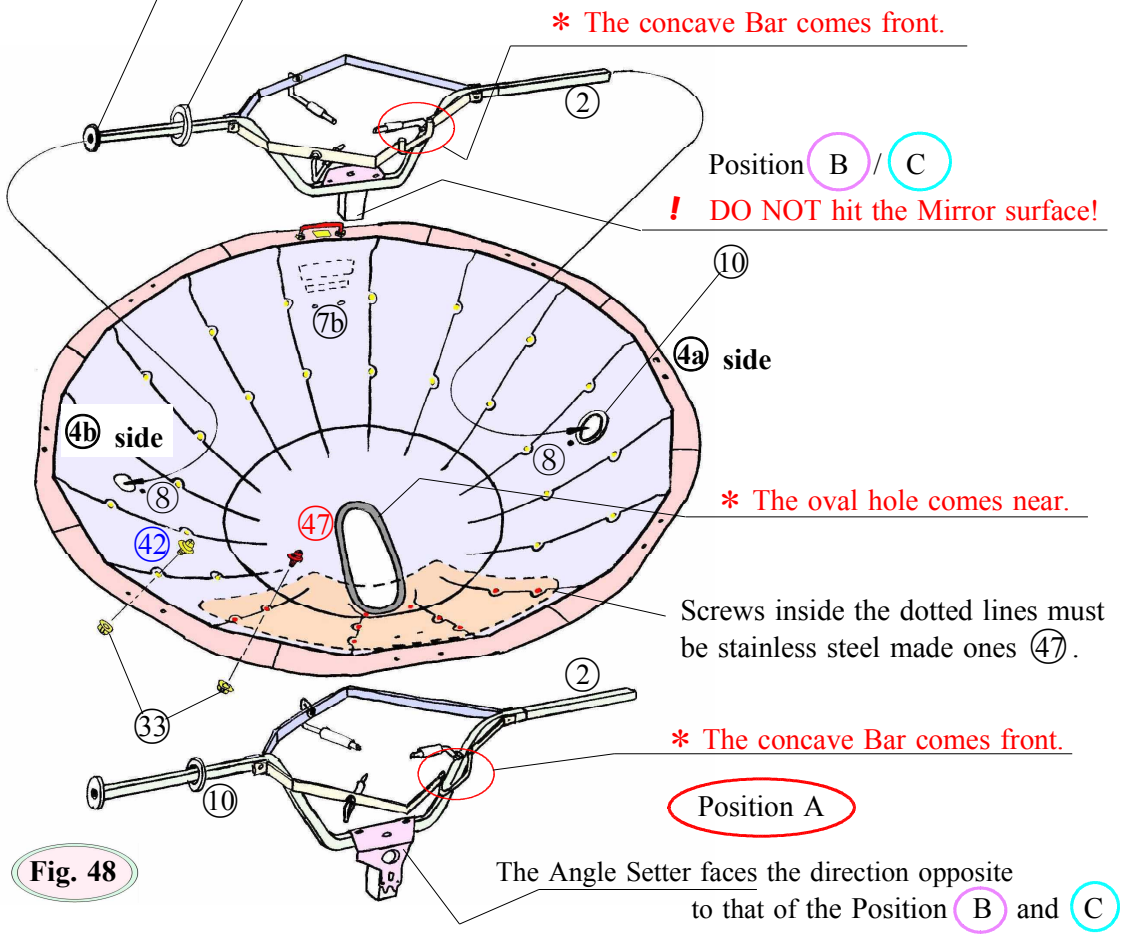


Fig. 48

NOTE! Be careful not to hit the Mirror surface with the Spacer Sleeve ⑯, when inserting it.

3. Set the Bush ⑩ at the ④a side into the hole on the Mirror ⑧ surface.

4. Remove the "washer tightening Screw" from the end of the Core Bar Assy.

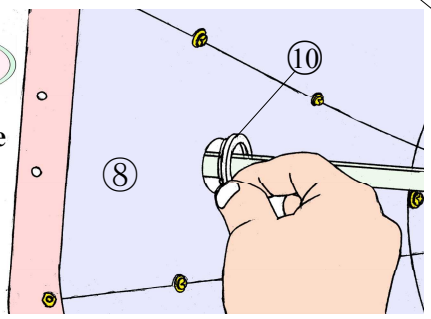


Fig. 49

④b **side**

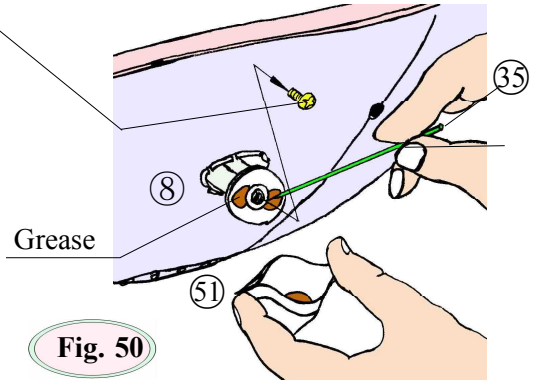


Fig. 50

5. Using a toothpick, grease slightly the washer on the end of the Core Bar Assy. at the ④b **side** to prevent frictions.

6. Now, the Holder B ④b is to be mounted on the Parabola.

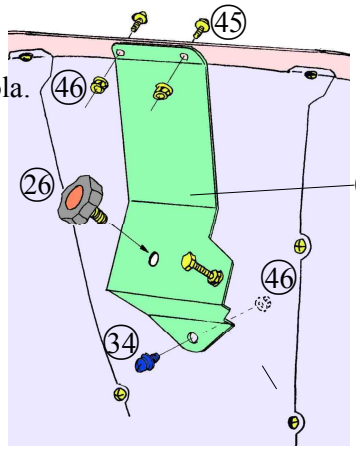


Fig. 51

7. Grease slightly around the hole on the inner side of the Holder A ④a.

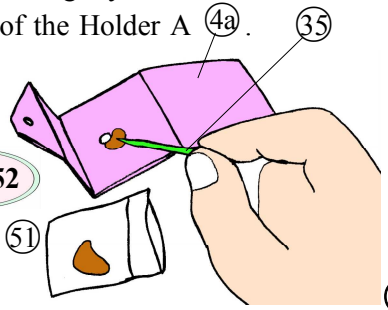
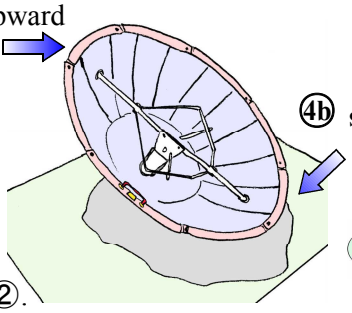


Fig. 52

④a **side** upward

8. Replacing the Parabola inclined make the ④a **side** upward helps to make your job easy.



④b **side** downward

Fig. 53

9. Apply instant adhesive ㊳ into the square hollow in the Bar-end Washer ㊸ before fitting it to the end of the Core Bar Extension ②.

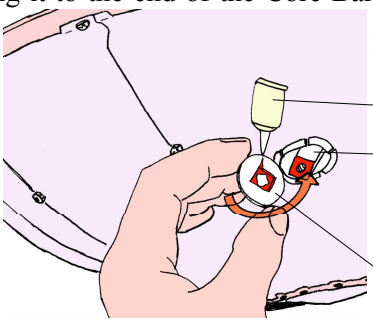


Fig. 54

Insert Screws ㊺ to the holes of the Outer Frame.

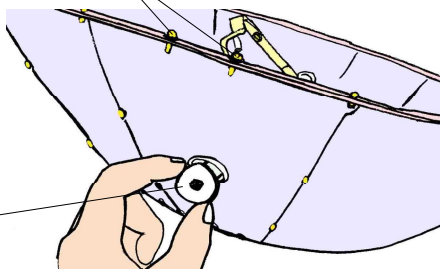
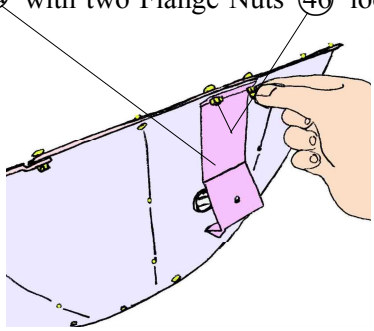


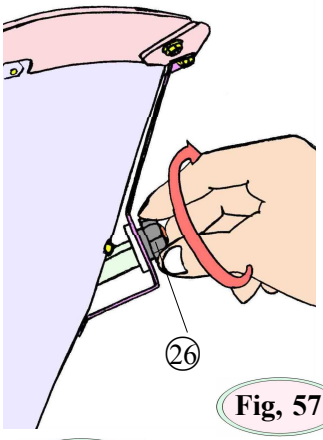
Fig. 55

NOTE! Be careful not to let the Washer ㊸ drop off during the work.

10. Set Holder A ④a with two Flange Nuts ㊻ loosely tighten.

Fig. 56





Fig, 57

11. Tighten the Bar with Knob Bolt C ㉖.

At this job, check the square hollow of the Bar-end Washer correctly covering the end of the Core Bar Extension ②.

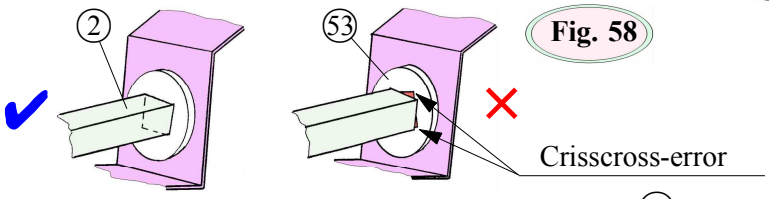


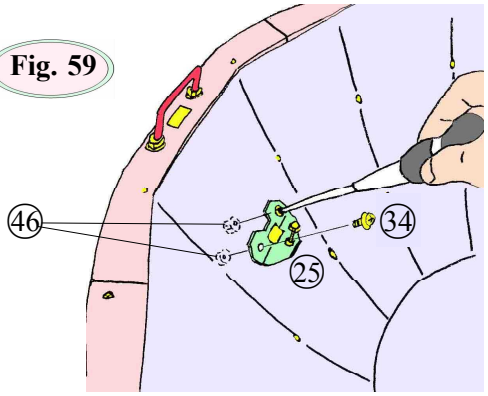
Fig. 58

NOTE! Ignoring such a crisscross-error and tightening the Knob Bolt C ㉖ may cause the deformation of the Core Bar Extension ② end.

12. After tightening the Screw ㉞, fully tighten the Screws ㊺.

13. Mount the Sighting Devise ㉕ inside the Parabola.

Fig. 59



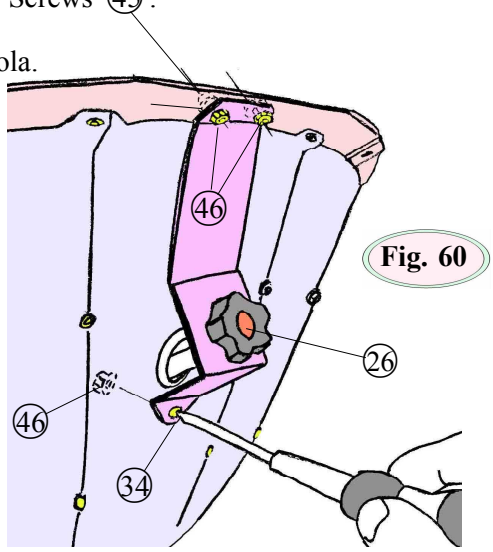


Fig. 60

7. Assembling the Pan

1. Mount the Grip on the Pan.

The hook-hole comes upward.

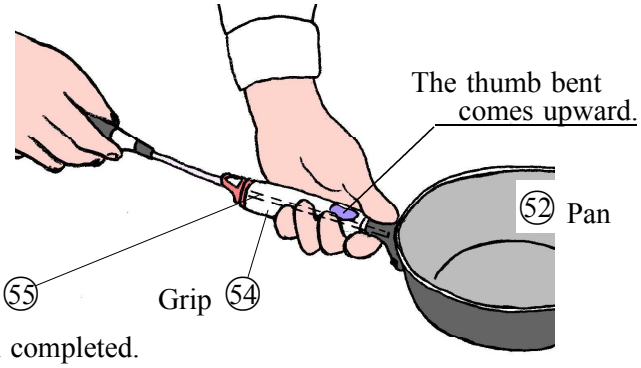


Fig. 61

All the assembling works now have been completed.

＊＊ Now, you start the next stage, the adjustment of the main body. Please refer to the “User Manual”. ＊＊

8. Adjusting the Trivet

1. Assemble the equipment, following instructions in the “User Manual”.

Your solar cooker assembled from the kit, as it stands, does not hold the pan in a perfectly horizontal position due to the following defects;

A. Looseness in the structure, and

B. Fudge factors in parts production and assembling.

In this step, such defects are to be corrected.

A. Correcting the tilt caused by looseness in the structure.

Due to a play between the Tripod Post and the Spacer Sleeve, the Trivet is slightly leaning forward.

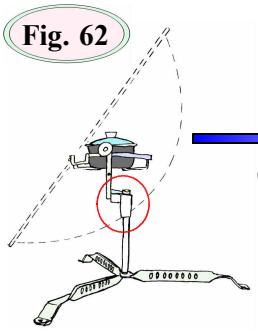
Hold the Pot Frame with your both hands, and give it a twist to adjust the tilt.

→ See **Fig. 62**.

When the Core Bar Assy. is in the Position B or Position C,

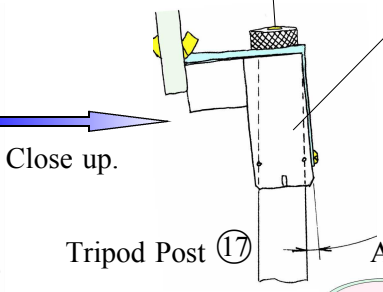
→ see **Figs 62**, **63** and **64**.

Fig. 62



Tighten Finger Nut K ㉙ slightly. ⑯ Spacer Sleeve

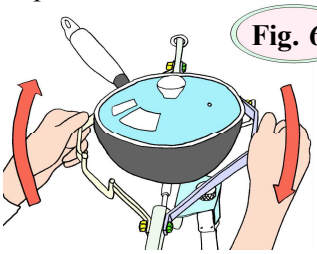
Close up.



Tripod Post ⑰ A tilt caused by a play.

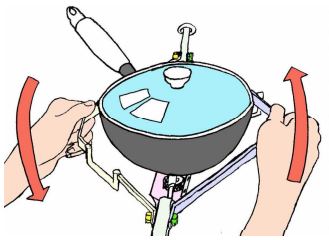
Fig. 63

Fig. 64



In the case of the Position A, twist the assy. counter-clockwise to correct a tilt as shown in **Fig. 65**.

Fig. 65



B. Correcting fudge factors in parts production and assembling.

Adjust the pan holding points of three trivet rods by bending them softly and gently with your fingers to make the position of the pod horizontal. When the rubber tubes of trivet rods hold the pan at three points at the periphery of its bottom, and pot is kept horizontal, you get the best result.

3 points support at the bottom periphery.

Fig. 66

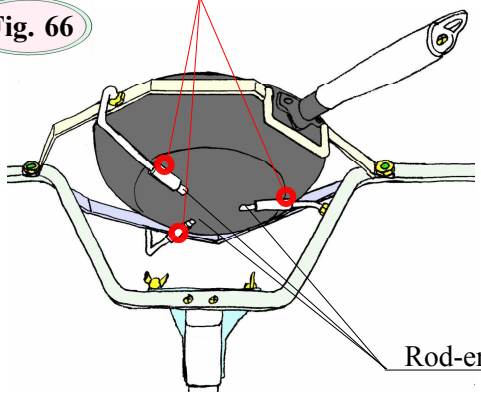
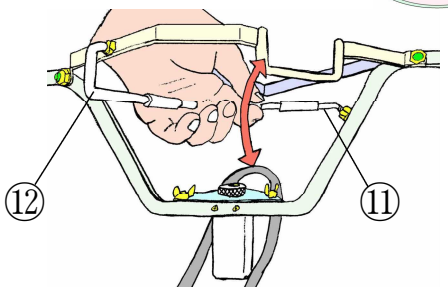


Fig. 67



Rod-ends hang slightly from the bottom.

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